

Learning with the Brain in Mind

By John Joseph

Using sophisticated imaging techniques to scan the brains of children and adults, researchers have identified key regions that the brain uses to perceive and process information. Although localisation within the brain plays a dominant and powerful role in learning, the local regions actually work simultaneously, combining like the sections of an orchestra.

Scientists continue to identify how discrete systems contribute towards particular types of learning. They have described a tentative model for how learning occurs and discovered where and how memories form, how memories construct themselves in light of new experiences and how we re-create memories through thinking. Whilst scientists continue their examinations of the brain, the education profession looks hopefully to gain some new insights into the nature of learning. With our centuries of experience and collective wisdom, educators now stand on the crest of a new wave of information about learning – an exciting potential unfolds. New questions arise. Hopeful remedies emerge that may stem the seemingly increasing number of young people who act out their life's frustrations at school.

While brain research does not provide a detailed pedagogic-type experience from which to implement a recipe-based structure it does shed new light on the big questions we face as educators. Are learning principles or organisational principles driving classrooms? To what degree does today's classroom environment match the biology of learning? Does brain research 'prove' anything or does it merely provide pathways and strategies that have a higher probability of success?

Brain research presents an unprecedented opportunity to reflect on the vast array of practices that make up learning and teaching, and to determine what actually benefits students in classrooms. It also offers an opportunity for educators to inform neuroscience. Our work is more of a craft than a science but educators know about the efficiency and effectiveness of learning strategies and we have centuries of collective wisdom gained from first hand experiences rather than laboratory studies. How can the knowledge gained from brain research and classroom observation improve learning and make the schooling experience more enjoyable, rewarding and satisfying for educators and students?

Each student hosts a brain that constructs a world as unique as a set of fingerprints. The classroom of the future will reflect the biological and social nature of diversity and create programs based more on our understanding of learning rather than on the latest methods of teaching. It is the purpose of this brief article to list 50 brain-compatible ways to boost learning in a classroom. The list represents highly practical strategies and I have deliberately constructed it without references to the original research for ease of reading and use. However, a brief bibliography occurs at the conclusion of the list. All references are available from Focus Education.

50 Ways to brain-compatible learning:

1. Encourage students to eat brain food: protein and fruit in the morning, carbohydrates after school. Better brain foods include fish, eggs, chicken, dark green vegetables, whole wheat, berries, bananas, avocados, brazil nuts and tomato products. The energy requirement of the brain dominates over all other organs. At least 20% of our food intake is directly utilised by the brain.
2. Ensure students have access to water before classes and during classes, especially in hot weather because the brain suffers quickly from dehydration.
3. Give students plenty of opportunities for exercise. Move around at least every 15 – 20 minutes because it increases the oxygen content of blood and prevents the circulation 'bottle-necks' that come about from sitting too long.
4. Move students to new seats at least once every day. It generates novelty and seating affects hemispheric fields of dominance and point of view.

5. Play music in classrooms at least some of the time because it affects blood flow patterns, chemical balances and contributes to the semantic memory pathway by adding elements of tone, rhythm and emotion.
6. Use multiple status groupings at least some of the time because it provides opportunities for peer teaching, achievement grouping and ways for students to contribute to each other.
7. Teach students how to create mind maps and other graphic organisers because it helps them to build information in ways that the brain actually stores it, reduces time when compared to note taking and emphasises design techniques with information.
8. Move from an answer-based system to a question-based one because the brain learns through intrinsic motivation and answering one's own questions is more motivational than answering someone else's questions.
9. Increase feedback to learners so they can affirm or self-correct their understanding and skills as they move through the learning. Misconceptions require remedial attention if they are committed to long-term memory. Quality feedback includes peer-reviews, rubrics, walk-and-talks, post-it-notes, 'roundtables', marks, anecdotal comments, 'talking chips', 'door passes', affirmations and self-assessment sentence stems.
10. Encourage students to create criteria for tests and other forms of assessment. Ask students to construct assessment pieces, administer these, assess them and self-correct their work. High involvement in self-correction leads to better learning.
11. Teach students how to visualise information in their minds and physically. Use multiple colours and multiple mediums such as paper, plastic, timber, card and whiteboards along with multiple writing implements such as coloured pens, different types of pencils, paint, crayons, textas, type. Novelty is the key to engagement. Make learning memorable through choice and difference.
12. Encourage students to learn how their brains actually learn. Organise a brain dissection with them (sheep brains are readily available from your local butcher). Use specific brain terms when students are learning so they know that learning requires a change in the anatomy of their brains (Focus Education created an extensive CD Rom with teacher and student notes for a unit on how the brain learns – see references section).
13. Tag learning regularly by asking students to write or state what they have learned. Many students are unaware that they learn things in classrooms and when asked, 'What did you learn?' reply, "Nuthin." Tagging eliminates this problem.
14. Turn intellectual learning into applications as often as possible. Utilise learning applications within the classroom and beyond the classroom.
15. Audio or video tape your lessons occasionally and ask students to take them home for review. You will be amazed at how much conversation these tapes generate.
16. Set up review cycles for learned material. Review key points after ten minutes or so, then after 24 hours, again after two days and yet again after seven days because these time frames allow for information to be processed through short-term memory, working memory and long-term memory.
17. To utilise the episodic component of memory teach important skills and concepts in different locations. For example, shift to outside or another room for a particular memory and when students are recalling, prompt them with suggestions such as, "Remember when we were outside last week what did we learn?"
18. Prime students with interesting posters, models and other displays at least a week ahead of when you teach a new skill or concept. Pre-exposure allows for implicit learning and has the effect of mapping the curriculum for kids.
19. Use acronyms and other memorisation techniques whenever possible because the brain learns well by association.
20. Use coloured overheads and Powerpoint shows. Play the themes of kids' favourite movies. Engage through novelty, strengthen through emotion, memorise through repetition.
21. Ask questions that elicit positive responses – "What will we find enjoyable about our classroom learning today?" Where enjoyment is unlikely due to the mundane nature of the learning task, ask questions about completing something, e.g., "What will be rewarding about this lesson?" Some of our most rewarding and satisfying moments come after completing something that was not enjoyable.
22. Stand at the door as the students arrive for class, and greet each one cheerfully by name. Watch the reactions you get! Give high fives and secret handshakes.

23. Give students choice over aspects of what they learn, how they learn it and the particular resources they use is a motivational strategy and a good state changer. Use Bloom's Taxonomy, Weiderhold's Question Matrix, DeBono's Hats, and Gardener's Intelligences to provide choice. (see Pohl's Teaching Thinking Skills in the Primary Years).
24. Drama and role-play are great media for expressing, and even expunging particular feelings. Added to that, dramatic activities usually require collaboration and if the focus is interesting and enjoyable student states are generally positive ones. Drama teachers are often great sources of interesting ideas and games that can be utilised in classrooms.
25. Having groups work on spelling challenges, rebuses, word or mathematical problems, riddles, crosswords, trivia or subject quizzes, and guessing games builds enjoyment, collaboration and positive emotional states.
26. Identify and utilise each student's learning styles and talents (see Focus Education's CD Rom, Learning Styles, Education Edition).
27. Incorporate regular, public rituals whenever students have achieved something special. Include celebrations, presentations, certificates, stickers and trophies. Demonstrate that learning is effortful but satisfying. Challenging but rewarding.
28. Always use students names in questions. For example, 'John, what would you do if...?' 'Sam, how might...?' A person's name is the sweetest sound they know. Kids love being acknowledged in questions.
29. Wear special props such as hats, crazy coats, masks and wigs. Buy and use crazy noise makers such as whistles, plastic drums and other beaters and so on. The novelty is fantastic for engagement. Encourage kids to bring in novelty items.
30. Teach about different types of thinking and emotion so students can relate to the intellectual, creative and emotional demands of each lesson (see Joseph's Learning in the Emotional Rooms, How to create classrooms that are uplifting for the spirit).
31. Ensure that a high proportion of any day is set aside for creative, design-oriented thinking and construction tasks as opposed to the more analytic, problem-based curriculum. The human brain thrives on creativity.
32. Use question generators to help students design questions that can be researched. Focus on 'How' questions because they are linked to the future. A sense of a future that is better than the present is fundamental to kids' engagement in learning.
33. Create dignified withdrawal options for students who get themselves into trouble in classrooms. Eliminate punishment-oriented practices that focus on guilt and threat and replace them with options that focus on repair and restitution.
34. Move away from rules and consequences to operational principles and guidelines because the latter creates flexibility within socially acceptable constraints.
35. Set homework tasks that encourage students to teach their parent and other family members what they have learnt.
36. Give praise publicly but reprimand when necessary, privately. Public humiliation creates guilt or excitement for children and both of these are poor instructors.
37. Create class rituals to finish and begin each day.
38. Teach students about the Hope And Despair Cycles (available from Focus Education). Demonstrate how to intervene in Despair thoughts by using the intellectual and emotional qualities of the brain.
39. Teach students about self-talk and how to train their thoughts to generate emotional states that strengthen them rather than weaken them
40. Use catch-up-learning-time (CULT) when students have missed lessons due to illness or behavioural issues.
41. Design lessons with opportunities to develop social, cognitive, creative, physical, aesthetic & emotional skills.
42. Reduce acceptance of mediocrity and set high expectations in a context of coaching, high levels of feedback and ritualised celebrations when success has been achieved.
43. Develop curriculum rubrics based on learning outcomes and coach students to move through the levels of the rubric. Rubrics can also be used as recording and reporting frameworks.
44. Carefully consider the implications of moving students into more complex learning before they have demonstrated mastery at the previous level. The compounding nature of this eventually leads students and their teachers into states of frustration.
45. When student motivation is high but achievement low ask for sight and hearing tests.

46. Create conditions for students to learn dependently, independently and interdependently. Use a range of groupings and set group roles with clearly defined statements and expectations. Keep individual accountability high by strategies such as coloured pens or individual type fonts to instantly recognise each student's contributions and numbered heads for reporting back to others.
47. Laugh regularly. Tell jokes. Buy a joke book if you're not intrinsically funny.
48. Reduce the use of negations such as 'don't do...' and replace them with 'do...' For example, instead of saying, 'Don't forget your homework.' Say 'Remember your homework.' The brain seems to respond better to what to actually do rather than what to actually avoid.
49. Set team goals and challenges and ask students to create ways to celebrate their team's achievements.
50. Tell stories and personal anecdotes with key messages embedded in them. Kids love stories. They like to hear the personal side of their teachers' lives.

I hope these 50 strategies provide you with at least some new ways to engage your students in their learning journey. Please feel free to write to me with any suggestions you have for inclusion in the list. Contact me at john.joseph@focusededucation.com.au

Remember to register for the South Australian Department of Education and Children's Services Learning Brain EXPO Down Under in Adelaide, 14th – 17th April 2004. Some of Australia's and the world's leading theorists and practitioners will share their knowledge and expertise.

References and resources

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NEW RELEASE**Brain workbooks for kids and teachers**

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